

# NASA TECH BRIEF



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## Thin Transparent Films Formed from Powdered Glass

**The problem:** Devising a method of forming glass films having a thickness of less than 5 mils.

**The solution:** Finely powdered glass dispersed in an organic liquid is deposited on a substrate and then fused in place to form a continuous thin film. The substrate can be separated from the film or retained for mechanical support.

**How it's done:** Bulk glass of the desired composition is ground to a fine powder which is then dispersed to a concentration of approximately 75 milligrams per milliliter in a solution of isopropyl alcohol and ethyl acetate. The larger glass particles are separated from the dispersion by centrifuging, leaving a dispersion containing approximately 5 milligrams per milliliter of the finer glass powder. This powder is then centrifuged from the dispersion onto a substrate of silicon or of an alloy foil having the same coefficient of thermal expansion as the glass. The substrate with the powdered glass layer is removed from the dispersant and then heated to fuse the glass into an adherent continuous film.

The silicon substrate can be removed by etching it on the underside with a 1:1 solution of hydrofluoric

and nitric acids. An alloy foil may be separated from the film by carefully flexing it to break the interfacial bond.

### Notes:

1. The thin films made by this method can be cut and shaped to form cover glasses for microscope slides, contact lenses, optical filters, capacitor dielectrics, insulating layers, and reflecting surfaces.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
Goddard Space Flight Center  
Greenbelt, Maryland, 20771  
Reference: B65-10217

**Patent status:** NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: Hoffman Electronics Corporation  
under contract to  
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